The Mining Journal

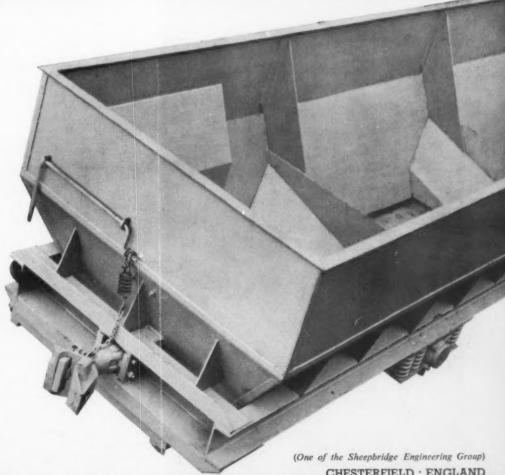
LONDON, SEPTEMBER 12, 1958

Vol. 251, No. 6421.

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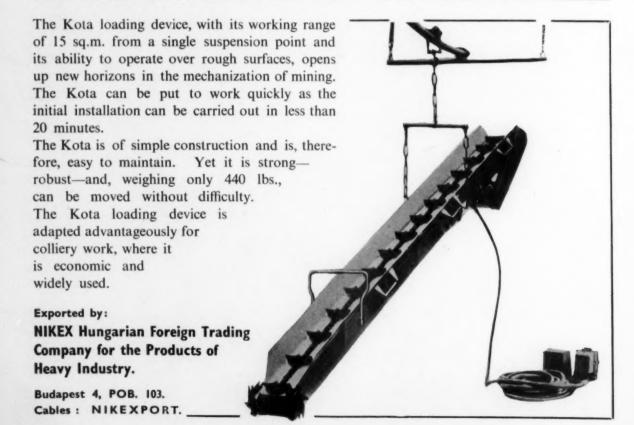


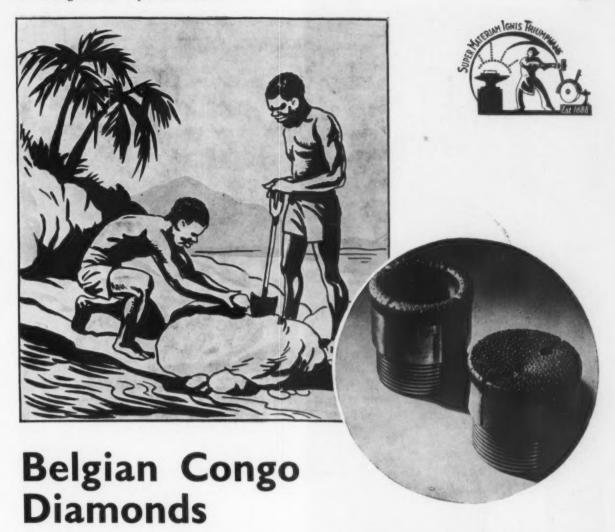
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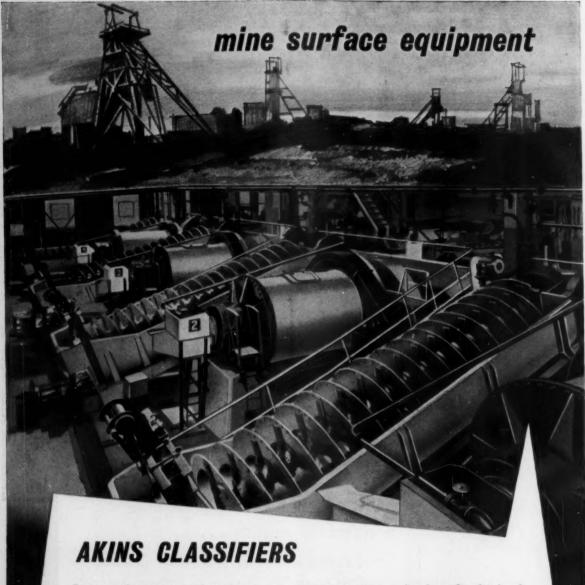


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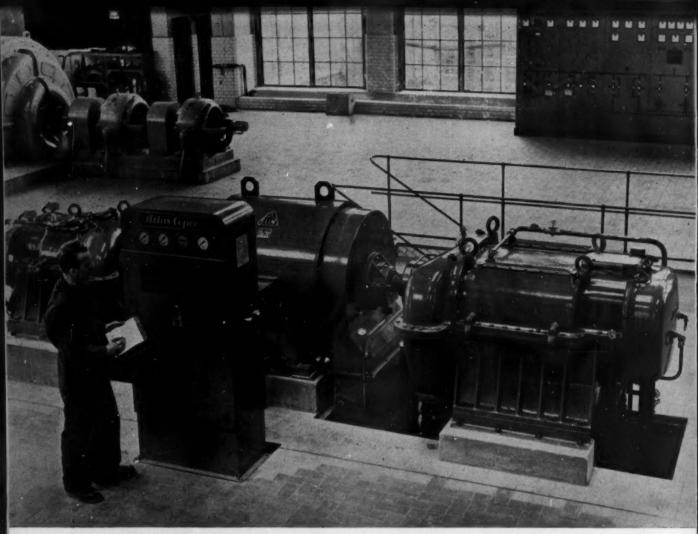
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The Mining Journal

London, September 12, 1958

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Bone-headedness on the Copperbelt

F present attitudes persist on the Copperbelt it would seem impossible to avoid a shutdown in at least some of the mines—at Roan Antelope and Nchanga and the uranium plants of the Rhokana Corporation. The dispute arises directly from the failure to agree on measures of economy which the copper companies insist are necessary if the Copperbelt is to hold its own in the forthcoming struggles for world markets. The specific point at issue has been the dividing line between the artisan and the nonartisan. In the past, custom has given to artisans certain jobs which do not require the artisan's degree of skill, and it is these jobs which the companies wish to see recognized as "non-artisan" jobs. Originally 38 jobs were in dispute, but these have now been reduced to 22.

However, though this is the point on which the issue arose, it is quite clear that both sides regard this as merely the *casus belli* and that what really lies behind the dispute is a far-reaching conflict on the right of management to operate its mines effectively against the right of unions to retain their privileges.

The technical position is that, negotiations having broken down, the European union has, by a 12 to 1 majority, voted in favour of strike action at the discretion of their committee; but even if a strike does not eventuate at this time, a closure might be inevitable if the union persists in its instruction to its members not to do the jobs in dispute.

This is a melancholy state of affairs and it bodes no good for either side. The European union is being stupidly obscurantist by sticking to its guns on an issue of this kind. If the mines are not brought to the pitch of maximum operating efficiency worse can happen to the union than the transfer of two or three dozen jobs from the artisan to non-artisan class. But it is not merely economically unwise for the union to stand on this issue, it is also morally indefensible, for the Federation depends largely on the profits of copper for its revenues, and to the extent that the union is featherbedding, it is placing its sectional advantage above the welfare of the entire community.

It may be that the European union is feeling the absence of a full-time secretary—this would certainly account for the erratic course of negotiations in the past two months — and for this it deserves sympathy; but whereas this might excuse a certain clumsiness in procedure it could hardly excuse the obscurantist nature of its general policy.

There is too, a useful lesson for the copper companies in the present dispute. While they have the right — and the duty — to secure maximum working efficiency at all times, it is always easier to secure it when things are going well and the workers are in no danger from falling demand. No doubt the companies, long conscious of a fair amount of featherbedding, had turned their eyes away from it on the two grounds that the profitability of the industry could support it and that it was dangerous to stir up trouble at a time when demand was overwhelming or when problems of African advancement were at a critical stage.

Now the companies have the more difficult task of tightening things up when demand for copper is low and the copper bonus much reduced. The great old times have gone and the workers are naturally sensitive to any changes that look like the thin ends of wedges. If there is a lesson for the copper companies in this affair, it is that they should aim to keep up an even pressure for maximum efficiency in good times as well as bad.

But there is another matter on which both sides should jointly ponder. It may be that, if the present dispute erupts into a strike or lockout, the government will feel called on to step in again. There could be another court of inquiry. Both sides ought to consider how many courts of inquiry there have been in the last decade and whether there have not been a great number too many. The upshot of constant bickering and failure to agree is that the industry as a whole tends to yield control of its affairs to arbitration and conciliation. Arbitration has its place but it was never intended to be a substitute for real collective bargaining. The industry is in some danger of making it so.

SLOW PROGRESS OF GEOLOGICAL MAPPING

The main functions of the Geological Survey of Great Britain, which is administered by the Department of Scientific and Industrial Research, is the production of up-to-date geological maps. The Council for Scientific and Industrial Research has in past years expressed concern at the slow progress of geological mapping, which is of basic importance not only to minerals exploration but also to civil engineering, building construction, and industrial development as a whole.

The report of the Geological Survey Board for 1957 records that the area covered by primary and revision surveys was greater than in recent years. Primary survey—i.e., survey for the first time on the 6-in. scale—was undertaken in several areas in England and also in the Highlands of Scotland. Revision or re-survey of the 6-in. geological maps of England, Wales and Scotland was continued, mainly in the coalfields; a similar survey was carried out in Northern Ireland.

While this improvement is noted with satisfaction, the Board emphasizes that there are large areas in Britain which have still to be surveyed for the first time on the 6-in. scale and that, if the current rate of progress is maintained, they will not be completed for at least 60 years; even in the areas of economic importance there is likely to be an interval of more than 30 years before it is possible to undertake an effective revision survey.

Geological mapping is a never-ending task. It is astonishing, however, that a small country such as the U.K., with its advanced technological resources and its long record of industrial progress, should be faced with the prospect of remaining incompletely mapped (on the 6-in. scale) for a further 60 years. It would appear that about the year 2018 A.D. our grandchildren—home, perhaps, from geophysical explorations on the Moon and Mars—will have the privilege of celebrating the news that Britain has at last been completely mapped!

The reason for this lamentable state of affairs is not that mapping has been proceeding, metaphorically speaking, at the pace of the ox, but that the Geological Survey has long been under-staffed. The report stresses the necessity for considerable increases of staff in all grades if the Survey and Museum are to fulfil their functions adequately.

There are at present nine field units in Great Britain. Next year, when the new Leeds office has been opened, these will be distributed equally between London, Leeds, and Edinburgh. The staff concerned with work in the North of England—at present based on London, Manchester and Newcastle—will be transferred to Leeds, and the Manchester and Newcastle offices will be closed. This arrangement will facilitate the work of the Geological Survey in the North of England. The field unit working in Northern Ireland will continue to be based upon Belfast.

The report also stresses the essential work of the special departments of palaeontology and petrography, which are concerned with the examination and identification of fossils, rocks and minerals, so that the geology may be accurately portrayed on the maps and adequately described in the memoirs explanatory of the maps. More rapid progress in field survey involves heavier demands upon the special departments and an appropriate balance is, therefore, necessary between field and geological staff, together with appropriate support in all the other grades of non-industrial staff.

The publication of the results of current field survey is not at present the only task in connection with maps and memoirs. The change in the format of the Ordnance Survey 6-in. topographical sheets must be followed by the reconstitution of the corresponding geological sheets; this work, which has just been started, will extend over many years. The stocks and printing materials of the 1-in. and 4-in. geological maps were destroyed by enemy action during the war; there are still heavy arrears in the replacement of these maps. Considerable stocks of memoirs were also lost by enemy action. The Board is thus concerned not only that more rapid progress should be made in field survey and the publication of the results, but also with the problems of replacing previously published maps and memoirs.

At the end of 1957 the total allocation of additional non-industrial staff for the quinquennium 1954-59 was 65, giving a complement of 285 at the end of the period. Unfortunately, it was found necessary to reduce the expected allocation of 12 non-industrial posts in 1957 to six. The Board urges that the full allocation of 65 should be restored during the current quinquennium.

For many years the D.S.I.R. was hamstrung by having to operate on an income which was budgeted for on a year-to-year basis. This handicap was removed when the government made funds available for a steady expansion in the Department's resources over the five years beginning April 1, 1954. A programme was drawn up which envisaged increasing the total staff over that period by about 1,000 and the annual net vote of the Department by about £900,000. In addition, £6,000,000 was granted to the Department for the erection of new buildings.

It is regrettable that the drive for economies in government expenditure, which had its genesis in last year's currency crisis, should have come when the benefits of this more liberal treatment were beginning to be reflected throughout the various organizations administered by the D.S.I.R., including the Geological Survey. The wisdom of cutting the nation's coat according to its cloth is borne out by the present strength of the pound. It is, nevertheless, questionable whether every cut in the government's expenditure was soundly conceived. Were we really in such financial straits that we had to save a few thousand pounds at the cost of allowing our programme of geological mapping to fall even further behind? Now that our reserves have been restored and the pound is again looking the dollar in the face, there can no longer be any justification for mortgaging our future by economizing in scientific research.

Even if the resources of the Geological Survey are greatly expanded, a long time must elapse before the mapping of Britain has been completed on a 6-in. scale. It is to be hoped, however, that the improved exchange posi-

tion will permit a more realistic financial approach to the Survey's needs, in order that, at least, the programme may be drastically speeded in the next quinquennium, 1959-64.

THE AUSTRALIAN TIN PICTURE

Australian demand for tin, resulting from the operations of the tinplate works at Port Kembla, New South Wales, is expected to approach 3,500 tons in about a year. This increase is unlikely to be met from Australian sources, although production by the two North Queensland dredges has improved considerably. In Tasmania, Aberfoyle Tin and North Australian Uranium Corporation are negotiating for the purchase of a controlling interest in the Storey's Creek Mine, which has long been regarded as one of the important tin-wolfram mines in the Commonwealth and could well replace the Aberfoyle Mine, which is approaching the end. Unfortunately, in view of existing markets, wolfram is the predominant mineral in Storey's Creek.

In the Northern Territory, a new company has been formed to work the Mount Harris Tin Mine, 90 miles south-east of Darwin and 26 miles north-north-east of Grove Hill.

The lode is traceable for 1,500 ft. Superficially, cassiterite occurs disseminated in laterite overlying a brecciated lode. Average width is stated as 4 ft. Vendors, with a small plant, recovered 11.5 tons of concentrates from 120 tons of ore, with tailings assaying 3 per cent tin. Overall grade of samples is stated to be 11.8 per cent tin. The lateritic deposit sampled is secondary; it may contain a good tonnage of ore, but the future will rest in the primary ore below the laterite capping.

The venture is interesting, particularly at the present time, and the occurrence is stated to be in new country. The Northern Territory is increasing in importance as a potential metalliferous province.

BRAZILIAN BERYL

In 1955, 1956 and 1957, the Brazilian Department of Mineral Production (D.N.P.M.), viséd permits to export 1,652,595, 2,306,783 and 1,937,916 kilos respectively of beryl, practically all destined for the United States. The values were quoted at \$U.S.597,500, equivalent approximately to 11,086,709 cruzeiros on the 1955 permits, \$861,152.47 and 15,810,759.30 crs. on those of 1956, and \$765,855.02 and 14,061,099.30 crs. in 1957.

Brazil's shipments to the U.S. tend to decrease owing to competition from other sources. In 1956 the United States imported beryl valued at \$4,459,400 from the following suppliers: Brazil, \$869,000; India, \$1,439,000; South Africa, \$214,000; Mozambique, \$360,000; Portugal, \$87,000; Argentina, \$789,000; Rhodesia, \$196,000; and the Belgian Congo, \$312,000.

Brazilian production of beryl totalled 2,106 tonnes in 1956. During the last six years production has oscillated between 2,882 tonnes in 1952, and 1,434 tonnes in 1954. Detailed statistics are not available after 1955. In that year the biggest producing states were: Minas Gerais, 1,295,750 kilos; Rio Grande do Norte, 250,900 kg.; Paraiba, 164,561 kg.; Ceara, 60,000 kg.; Bahia, 1,772 kg. Total, 1,772,982 kg.

The following deposits were being exploited in 1955. The output of each, in kilos, is indicated:

Minas Gerais—Aracuai (159,500); Conselheiro Pena (15,280); Governador Valladares (285,500); Itinga (276,950); Medina (21,000); Sabinopolis (13,700); Salinas (253,820); Santa Maria do Suacui (220,000); Sao Joao do Paraiso (50,000). Total, 1,295,750 kilos.

Rio Grande do Norte—Acari (24,000); Alexandria (1,000); Carnauba dos Dantas (71,400); Ceiro Cora (14,000); Currais Novas (12,000); Jardim do Serido (7,700); Parelhas (79,800); Sao Tome (41,000). Total, 250,900 kilos.

Paraiba—Alagoa Grande (10,600); Picui (150,000); Soledade (3,961). Total, 164,561 kilos.

Ceara-Solonopole (60,000).

Bahia-Itambe (1,772).

Other occurrences exist, but are not at present exploited, in the States of Espirito Santo, Rio de Janeiro, Pernambuco and Sao Paulo also at Carai, in Minas Gerais, and at Brumado and Conquista, in Bahia.

Dr. Evaldo Osorio Ferreira, in an article published in Engenharia, Mineracao e Metalurgia (Rio) writes that, in Bahia, beryl usually occurs in veins of pegmatite cutting pre-Cambrian crystalline rocks. In the north-east it is found in complex heterogeneous pegmatites, intensely mineralized, containing tantalite, columbite, cassiterite, spodumene, amblygonite, monazite and uranium minerals. In Minas Gerais, Espirito Santo and Rio de Janeiro beryl occurs in less highly mineralized pegmatites, accompanied by tourmalin, columbite and radioactive minerals.

Since 1951, beryl, which is classified as an atomic source mineral, can only be mined, transported or transformed with the approval of the National Research Council.

In June, 1954, a presidential decree fixed at 4,000 tonnes the annual export quota of beryl in the form of primary concentrate, or the equivalent quantity of metallic beryllium in the case of industrialized products. The decree established the net price f.o.b. Brazil at \$U.S.46 per unit of tenor in the tonne, 90 per cent to be paid against shipping documents. Any difference between the Brazilian analysis and that made at destination is adjusted when final payment is made.

BRITISH COAL SLUMP

For some years it has been evident that the British coal mining industry is coming towards the end of its post-nationalization honeymoon. Despite the £100,000,000 yearly investment in the pits, total output from N.C.B. mines in 1957 and the output per man-year were less than in 1951. Costs of mining this coal were, however, appreciably higher and it is the belated recognition of the fact that costs are all-important that has jolted the industry out of its erstwhile complacency. Already oil has made very great advances in those markets where it is in competition with coal and from 1953 to 1957 its use increased to the extent of 7,500,000 tons of coal equivalent.

As Sir James Bowman, Chairman of the National Coal Board, recently pointed out, what is even more significant is the rate at which oil consumption is accelerating even in the face of the overall decline in British industrial activity. Thus, for example, whereas the inland consumption of coal has decreased this year by 3,500,000 tons compared with the corresponding period of 1957 and nearly 7,000,000 tons compared with 1956, the consumption of oil has increased by 5,000,000 tons (57 per cent) and 4,250,000 tons (43 per cent) respectively. As a result of the current oil conversion programme embarked upon by the Central Electricity Authority, figures are expected to be even more striking in the near future.

Faced with this increase in oil imports, loss of overseas coal markets, and a decline in industrial activity at home, the National Coal Board and the Miners' Union will have to get down to some serious heart-searching if the industry is to pull out of the mess in which it now finds itself.

MADAGASCAR-II

Graphite and

Mica in

Madagascar

MADAGASCAR

Menden Service Andrews And

RAPHITE is Madagascar's foremost mineral product, both as regards volume and value of exports. It is encountered over widespread crystalline areas, in the form of quite large flakes. Many deposits, carrying up to 10 per cent graphite content, have been discovered along the N-S axis in Middle-Eastern Madagascar. Brickaville is the leading centre, while other deposits are worked in the Tamatave, Vatomandry and Moromanga areas.

One of the main uses is in the fabrication of metallurgical crucibles, hence the U.K. undertaking, Morgan Crucible Co. Ltd., is a steady importer. The material goes also into atomic piles; thus, the U.S. has contracted for important amounts on a long-term basis, covering 2,500 tonnes or half the home-country's total requirements. The fact that the GI atomic pile at La Marcoule was activated with only 20 tonnes of uranium bears witness to the exceptional quality of local graphite. Germany and Japan are the main importers.

Nevertheless, local graphite is too expensive. It thus suffers from increasing competition of much cheaper graphite powder, man-made graphite, and of carborundum, which has displaced it in some of its uses. This accounts for the decrease in local exports from 18,000 tonnes in 1952 to 15,000 tonnes last year.

Mica is second only to graphite and most of it — as is also the case with Canada — belongs to the dark, non-transparent phlogopite brand, the appearance and uses of which differ widely from the light and transparent muscovite brand, of which India is the foremost producer in

the world. Exports are made up as to 50 per cent of grade 6 and 30 per cent of grade 5, while grade 4 accounts for 5 per cent. It is thus no wonder that the U.S. acquired for her strategic stockpile 500 tonnes of highly heat-resistant grades between 1951 and 1953.

A drawback is that the local deposits are incapable of mechanization to any great extent. The high prices of the material led the U.S. to encourage home production by means of subsidies. The SAMICA Franco-Swiss process for obtaining from mica waste acceptable substitutes for micanite and micafolium, and competition from the cheaper Indian produce, are reasons why exports fell from a peak of 1,069 tonnes in 1952 to 627 tonnes in 1955. Exploitation of most of the local deposits has been abandoned.

New Lease of Life

But since Madagascar is the sole producer of the commodity in the French Union — supplying 250 tonnes of the home country's yearly consumption out of a total 1,500 tonnes — State subsidies and tax exemptions have come to give the ailing industry a new lease of life. Exports have been boosted to some 1,000 tonnes per year. One-third of this is turned out by the Société des Minerais de la Grande Ile.

Map by courtesy of the Office of the Premier of France. Photographs are by courtesy of the Ministry of Overseas France

Alongside, at right, mica exploitation at Ampandrandava, Madagascar

Below, at right, a graphite washery at Andavabato



Mica prospects seem bright, as France's partners in the Common Market bid fair to step into America's shoes: they have recently doubled their consumption. Still, it is imperative that prices should be lowered.

In an effort to reduce the 1,250 tonnes of muscovite that the home country has to import yearly from India, the Murovato deposits have come in for a good deal of probing. Quite a few phlogopite outcroppings, capable of commercial exploitation, have been uncovered in the Mafilefy area, in deep South Madagascar.

This search is conducted within the larger framework of the exploitation of pegmatites, which occur in massive accumulations all over the island. As is also the case with Brazil, these coarsely-grained crystalline granites contain a host of valuable minerals — columbite - tantalite, lithium, zirconium, cassiterite, tourmaline, beryl, and many others.

These pegmatites yield 15 to 20 tonnes a year of precious and semi-precious stones, mainly garnet and beryl while 2.6 to 3 tonnes of columbite-tantalite are obtained as a valuable by-product. Otherwise, the mineral is encountered in too low-grade deposits to be economically exploited. Up to now, uranium has been found in pegmatites in too poor and too complex a form to be payable.

A Flat Note

In regard to the much trumpeted urano-thorianite in the Fort-Dauphin area, South Madagascar, the powers-that-be have proved too sanguine and too hasty in their estimates of local reserves, according to the Société des Minerais de la Grande Ile, the concession-holder.

By Maurice Moyal,

Editor of "Petroleum Mirror", the monthly newsletter of the French petroleum industry.

Only shallow layers have proved capable of a modest measure of exploitation, not at all commensurate with the high costs of prospecting and delineating them. Equipment, which though simple enough is well adapted to the treatment of local ores, has been provided. Another treatment plant for radioactive sands may be constructed.

Other Occurrences

Ilmenite indications at Fénérive and coal seams at Sakoa, in South-Western Madagascar, are under investigation to evaluate their calibre. In the same area, the Société des Pétroles de Madagascar has little to show for the six deep wells it sunk for oil in two years.

Hydro-electricity seems the likeliest source of power. An Electricité de France mission has been surveying the more favourable torrent sites all over the country. Only the advent of cheap power will further the creation of industrial complexes to process local minerals on the spot, making them more competitive on the world markets.



New Canadian Processes for Low-grade Iron Ores

HERE are about a score of known low-grade iron deposits stretching from near the Manitoba border in North Ontario eastwards to Ungava, representing vast tonnages that so far have not been economically attractive, and the possibility of processing this type of ore would no doubt assure early development of these properties. The processes studied by the O.R.F. have included the dry magnetic concentration of iron ore; flash-roasting techniques for non-magnetic ores; jet-smelting of dry magnetic concentrates; and a new type of machine for rolling dry concentrates into pellets.

The dry method of grinding and concentrating magnetic ore has been studied in view of the large and regular supplies of water required for the so far adopted wet process. In Northern Ontario, where water may be scarce and freezing comes early, a dry process could offer great advantages. It also eliminates the problem of effluent disposal and water pollution.

In recent years, dry grinding of iron ore has been carried out in such units as the Aerofall mill and the Hardinge Cascade mill, the dry dust product being airswept to dust-collecting equipment by modern techniques which are proof against silica hazards. The O.R.F. has also developed and built magnetite super-concentrators for making very high-grade concentrate for direct reduction into sponge iron powder and steel, and, later, for producing magnetite concentrates for blast-furnace use. Pilot laboratory models of such equipment were constructed and commercial development of large concentrators was then sponsored and financed by Research-Cottrell Inc., of Bound Brook, N.J., the aim being to treat all sizes of

Various processes, which may greatly improve the outlook for Canada's tremendous reserves of low-grade iron ore, have been the subject of recent investigations by the Department of Engineering and Metallurgy of the Ontario Research Foundation and have been brought to the development stage of operation.

particles down to the finest dust. This is now claimed to have been satisfactorily accomplished, and patents have been applied for and licensed, except in Canada, to Research-Cottrell.

Basic to dry magnetic concentration is the individual treatment of magnetite particles in a single layer by specially designed small, powerful permanent magnets mounted on a drum, outside which an independent drum of stainless steel rotates at a different speed, both speeds being very high compared with the wet process. The resulting magnetic field set up on the surface of the stainless-steel shell causes the magnetite particles to travel individually over its surface in an opposite direction to the rotation of the magnet drum. This is the same principle as that used by Professor S. Mörtsell in Sweden and further developed by Stora Kopparberg.

No mechanical feeding or discharging is used and the force of gravity is used to aid the separation of non-magnetic from magnetic particles. Particles finer than 150 mesh must be separated from an airborne stream with about 3 cu. ft. of air per lb. of dust, unless the weight of magnetite present is less than 15 per cent of that of the dust. An opposing air stream performs the same function as the water wash in wet magnetic concentrators.

Four machine types have been developed for dealing with different size particles of from about -6 mesh to +100 mesh to -325 mesh. The two rougher type machines are fed with settled dust from hoppers, while the two magnetic precipitators for dealing with fine particles are fed from an airborne stream.

Those separators intended to deal with -100 mesh particles are of the over-feed or under-feed type, the con-



Above, at right, a fast eccentric drum for use on -8 mesh and +200 mesh particles. Tailings are thrown by centrifugal force, while the concentrate travels about 230 deg. around the drum before being discharged

Alongside, at left, is shown dry grinding and dry magnetic equipment with a capacity of 1,000 lb. per hr. of -8 in, run-of-mine ore used by O.R.F. in their pilot operations

centrate travelling on the drum, while the tailings are thrown apart. The concentrate from these machines would normally be returned as middlings to the circuit.

In the concentration of -60 to +200 mesh dust by the fast eccentric drum, the outer stainless-steel drum, which is eccentric to the inner magnetic drum, forms the bottom of the self-feed hopper, and material is drawn on to the drum both by friction and by agitation from the magnetic field. Gangue particles are thrown free of the drum by centrifugal force, while the individual magnetite particles proceed around the drum. At the point of discharge of the magnetite, where the outer drum is farthest from the inner drum, centrifugal force overcomes the magnetic pull' and the magnetite is thrown free. This equipment can be used as a cobber to return a middling to the grinding circuit and, say O.R.F., has proved especially efficient when used in conjunction with an Aerofall mill in closed circuit. It will also provide a satisfactory finished concentrate with some coarse-grained magnetite ores, and the units can be placed in series to re-treat the tailings and concentrate,

To make a finished concentrate of from -150 mesh ore containing less than 30 per cent of -325 mesh particles, double helix equipment can be used. This can be fed by passing the dust stream from an Aerofall mill, for example, first through a horizontal classifier to eliminate +150 mesh particles and then passing the finer airborne dust through a cyclone-type dust collector with auxiliary draught equipment to withdraw a controlled proportion of the air from the bottom of the collector. The double helix equipment can be built into the bottom of the dust collector, several drums in series normally being used to achieve a good grade of concentrate combined with high capacity. The concentrate is discharged at a point in a flare where centrifugal force overcomes the magnetic force.

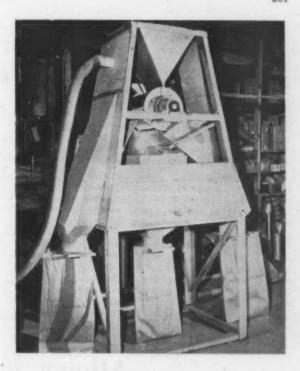
To concentrate very fine dust from an airborne stream, magnetic precipitators, of either the cyclone or flue type, have been used by O.R.F.

All four units can be combined in several ways to provide a useful flow-sheet, and are very suited to use with an Aerofall or other dry-grinding mill delivering the ground ore in an air stream. Performance on large-scale pilot runs is claimed to have equalled the results from wet concentration methods and commercial designs are now ready. The dry concentration method is also claimed to make the concentration of magnetically roasted hematites more attractive economically.

RECOMMENDED FLOW SHEET PERFORMANCE

Concentrate Grade

63.2 per cent total Fe 61.6 per cent acid sol.	Fe Concentra	tion Rati	89 · 0 pc	er cent to	tal acid so tal av. reco	ol. overable
Detailed Results :	Feed	Conc.			M/clone	Dust
Weight % feed	7,260 100	2,609 35·9	1,475 20·3	2.237 30·8	617 8·5	322 4-4
A.S.Fe Magnetite Fe (Davis tube) Hematite Fe Silicate Fe Total Fe units A.S. Fe units Mag. Fe units (Davis tube)	3·43% 8·79% 35·25 25·46	4·10% 1·60% 22·70 22·10 20·70	5·7 % 2·05% 3·75% 14·60% 4·12 1·16	3.9 % 1.28 % 2.93 % 13.20 % 5.26	15-2 % 11-80 % 3-30 % 9-10 % 2-07 1-29 1-00	0.53
Grade = $63 \cdot 2\%$ Recovery = (a) $85 \cdot 7\%$ (b)	98.5%			Weight = Ratio =		
Screen analyses of concentra	ite:	In	purities :			
	nge % -2.0 -6.0 -10.0 -16.0 -18.0 -19.0 -40.0		SiO ₂ S P Mn Ti Al ₂ O ₂ CaO MgO	0	0 - 9 · 0 per 03 per cen 02 per cen 1 per cen 1 per cen 8 - 1 · 0 per 4 - 0 · 6 per 2 - 0 · 4 per	it it it ir cent
(a) Total Fe units/A.S.	Fe units	(b)	Total Fe	units/Ma	g. Fe unit	8.



Among the ore samples processed by O.R.F. was one from the Ungava property of Oceanic Iron Ore Co. Ltd., for which the recommended flow-sheet included (1) the use of the fast eccentric drum in a cobbing circuit for the coarser classifier bleed-off at -20 +200 mesh, representing a two-drum, re-pass operation, middlings being recycled to the Aerofall mill and a clean tailing being produced; (2) the passing of the -150 mesh fines to a cyclone dust collector operated with secondary air suction at the bottom, which withdrew about 10 per cent of the air in the dust collector along with the dust, giving a suspended dust feed to the double helix concentrator, the tailing being re-cleaned in a drum separator, producing clean tails and a middling for re-cycle to the Aerofall mill: when used as a four-bank helix, this equipment produced a highgrade concentrate; and (3) -325 mesh fines being retreated to reclaim part of the iron.

The sample of Oceanic ore contained 36 per cent total iron, 27.5 per cent acid soluble iron, and 25.5 per cent recoverable iron by Davis tube. The performance of the recommended flow-sheet is shown in the table.

The Oceanic concentrate produced by this processing was considered probably to be deficient in fines for satisfactory pelletizing and when a minimum of excessively fine dust was aimed at for best operation of the equipment, it was not possible to make satisfactory concentrate with good recovery directly from -20 + 200 horizontal classifier bleed-off.

It was considered that the capacity and performance of the double helix concentrator could be considerably improved over the results obtained in this pilot run. Shutdown and start-up of the complete operation could be carried out without any significant effect on the results obtained.

For low-grade non-magnetic ore, a flash-roasting technique has been developed by O.R.F. to convert it into a magnetic form which can be treated in the same dry magnetic concentrating equipment. Natural gas or oil is used as fuel. A new type of machine for rolling dry concentrates into pellets has also been developed.

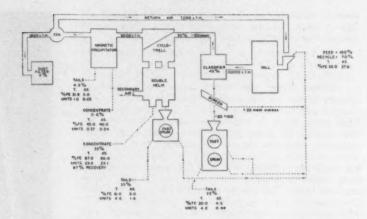
Possible Oceanic iron ore flow sheet

In the new iron-ore laboratories of the Ontario Research Foundation, dry magnetite concentrates have been fed into a jet smelter furnace to produce melting stock suitable for use by secondary producers, such as rolling mills, as well as the blast furnaces of the big integrated steel companies, which latter only are able to use pellets. Such melting stock can be melted down with scrap metal.

This conversion of dry concentrates into melting stock is said to upgrade a product priced about \$13 a ton to one commanding about \$65 a ton and the process to open up a huge market potential for the low-grade mine, probably making the metal

capable of standing transport costs to the United States or even Europe. Natural gas, piped from the Alberta natural gas field, is regarded as the obvious fuel for ore deposits west of Sudbury, Ont., and the process could become one of the largest single markets for gas in Canada. For treating the Ungava ores, oil could comfortably be obtained.

It will take some time to translate these developments into large-scale production lines, but, in the meantime,



sights are being focused on an even greater possibility—that of producing steel direct from super-concentrated iron ore.

The Department of Engineering and Metallurgy at the Ontario Research Foundation, Toronto, is under the direction of P. E. Cavanagh, P.Eng., and it is to him that the writer is indebted for most of the material upon which the article is based.

Mining in Bulgaria

ETAILS published recently in Sofia of the Third Five Year Plan (to cover the periods 1958-1962) of the Bulgarian People's Republic are remarkable, above all, in respect of mining and heavy industry, new features in the economy since the last war.

Coal output is to be raised to 19,215,000 tons a year, representing an increase of 62 per cent, as compared with 1957. This increase is the more remarkable because output for the present year is to be maintained only at approximately the same level of last year, i.e. at about 12,000,000 tons, because there has accumulated a surplus of some 550,000 tons, due to over-production last year, and the mines will, therefore, not be worked at full capacity. The eventual increase is to be secured by the opening up of new fields with an annual capacity estimated at some 10,000,000 tons, of which 93 per cent will be opencast.

The foregoing figures cover both hard coal and lignite, the relative proportions of which are not indicated, but where lignite is mined, it will be used in a manner little different from hard coal, as it is in the German Democratic Republic, whence plant, technical advice and assistance to that end is being secured, though the actual plans are being worked out by the Bulgarians themselves in the Mining-Research Institute of the Government Department known as "Minproekt".

Work has been started already, beside the new opencast lignite mine at Maritsa-Istok, not far from Sofia, which has reserves to last several centuries, on a briquetting factory, to which reference is made in the Plan, with an annual capacity of 1,800,000 tons, and which will be producing 1,200,000 tons annually by 1962. The calorific value of the briquettes produced will be 3,800 calories per kg., which is almost that of the best hard coal. This factory will, of course, produce also many valuable chemicals, as will the coking plant with an annual capacity of 350,000 tons which is to be set up beside the new hard coal mines in the Balkan mining basin, together with an enriching plant with a capacity of 1,000,000 tons a year. The briquettes produced at

Maritsa-Istok are to be used primarily for electric power production, while the coke from the Balkan coalfield will be required for the expanding iron and steel industry referred to below.

The probability is that Bulgaria will eventually have coal and coal-products surplus to her own internal requirements, however much these may grow, and therefore available for export to coal-deficient countries in the Middle East.

Bulgaria's coal reserves—as so far located—are estimated at 33,000,000 tons of black coal, 300,000,000 tons of brown coal, and 3,500,000 tons of lignite.

Output of non-ferrous metals has been raised, the percentages shown indicating the increase as compared with 1957:—

Concentrate	S		***	***	437,300	tons	145%
Electrolytic	Copper			***	12,630	tons	
Lead	***	***			33,000	tons	173%
Zinc	***	***	***	***	44,000	tons	586%

The bulk of this production will be in the mining area which has been developed in recent years in the Rhodope mountains, near the Greek border, where remarkable progress has already been achieved, despite extremely difficult conditions, including an almost complete lack of roads and housing, and a complete lack of railway communications. The methods employed for refining are modern, as is the plant, most of which, it is interesting to note, is of Bulgarian design and construction.

Bulgaria's reserves so far located are estimated at 50,000,000 tons of lead-zinc ores and 10,000,000 tons of copper ore.

Judging by past performance over the last ten years, i.e. during the First and Second Five Year Plans, there is every reason to expect that this Third Five Year Plan will be accomplished, if not exceeded. It would not be surprising, however, if it were considerably modified as the result of new discoveries of minerals, for the Bulgarian Government is still spending 294,000,000 leva a year (approximately £15,000,000) on geological prospecting.

Technical Briefs

Valuable Review on Fluorite Flotation

The C.S.I.R.O. and the University of Melbourne have recently published a valuable review on fluorite flotation, as Information Circular, No. 4, May, 1958. The publication deals with the standard practice involving the use of oleic acid as collector, water softening, and the use of heated circuits, which also includes some useful information on troublesome separations and the possible use of other collectors, whilst a very full bibliography is appended.

When dealing with the desirability of softening the water used, it is pointed out that although the widely accepted reason is that such treatment removes calcium and magnesium ions which would otherwise consume the collector, the explanation is not convincing, at least in the case of calcium.

A more reasonable explanation is suggested, namely: that the removal of cations in this way removes those which would otherwise function as gangue activators. Such ions are those of calcium, barium, copper, iron, lead, and aluminium, and if this is the case the same results might be obtained by using sequestering compounds.

The question of barite depression is also considered very fully, and mention is made of sodium fluoride with either magnesium ligrin sulphonate or a soluble starch or gum in this connection, and it is interesting to note that sodium fluoride has been used with success on some British ores.

The use of alkyl sulphonates is also suggested, and attention is called to the fact that cationic collectors have found little application in spite of the fact that they do not require elevated temperatures and are seldom affected by cations to the same extent as a fatty acid collector. On the other hand, of course, acid circuits are usually essential for quartz depression, and this is not possible in the presence of calcite.

FINE GRINDING AT SUPER-CRITICAL SPEED

Professor Hukki, who contributed a paper to the International Mineral Dressing Congress in Stockholm last autumn. recently has pointed out that although the possibility of grinding at supercritical speed has been known for more than fifty years, little has been done in the way of investigation. Professor Hukki suggests that none of the previous investigators have really grasped the simplicity of the basic principles involved. Super-critical speed operation, he says, is now an established fact, and is an economic success on an industrial scale. The speed of the mill can be increased into this range. If the total mass of grinding medium decreases, the mass of individual pieces of the medium increases, or if the coefficient of friction between the outer layer of medium and the mill lining decreases.

In a mill having a smooth lining and any usual load occupying about 50 per cent of the volume there is very little slippage, and, when ribbed linings are used, no slippage is encountered. On the other hand, if a mill possesses the right conditions with a smaller load, the shell can be run above the so-called critical speed when the outermost layer of the medium is moving at something less than the critical speed. This differential produces very effective attrition grinding, the share of this attrition grinding increasing rapidly with increasing speed in the super-critical range.

Work done on autogeneous medium suggests that the best results are obtained with low-discharge mills, and that, as the s.p.g. differential between the ore and the pebbles increases, the advantage of a low discharge is less apparent. As far as the relation between mill speed and capacity is concerned, it is suggested that rather than the usual linear relationship, the capacity increases as a power function, the exponent being 1.4, and that at super-critical speeds the throughput might reach startling proportions. Apparently, idling power for a mill at higher speeds is not likely to be increased in proportion to the power used in tumbling the load. Furthermore, Hukki suggests from theoretical considerations that it may be possible to use high-speed autogeneous mills to compete in capacity and in performance with low-speed mills using steel balls.

The question of the shape of grinding media and wear at super-critical speed has also been discussed from the same source. As far as the latter is concerned, no evidence is given of its magnitude, but it is pointed out that if mine ore could be used this would not be of serious concern.

SODIUM SILICATES IN NON-METALLIC FLOTATION

Although sodium silicate is the most widely used dispersant and gangue depressant, little attention has been paid to the silica-soda ratio. Working on two scheelite ores, one from Korea and one from Nevada, Sollenberger and Greenwalt have shown that considerable improvement in both grade and recovery can be obtained by careful selection of the proper silica-soda ratio. Their work shows that a ratio of 2.4 to 2.9 at a silicate concentration of 4 lb. per ton at pH of 10 produces the highest grade and ratio of concentration. At lower concentrations or at lower pH, namely: at 6.5, the silica-to-soda ratio had little or no significant effect.

THE LEACHING OF MANGANESE FROM PYROLUSITE

A recent report of the Mines Branch. Canadian Department of Mines, describes a new method of leaching low-grade manganese ore, i.e. under 5 per cent iron, utilizing pyrite as a reagent. By heating an aerated slurry of ore and pyrite, and by recycling the leach liquor at controlled acidity to attach fresh ore. a manganous sulphate solution free of iron is obtained.

In an alternative procedure, an aqueous slurry of pyrite is autoclaved,

first in oxygen pressure and then, in the absence of oxygen, producing an acid ferrous sulphate solution suitable for leaching pyrolusite at ambient temperature.

The method is described by G. Thomas and B. J. P. Whalley in the Department of Mines' Branch Research Report, R-3.

SINTERED TUNGSTEN CARBIDE POWDERS

The Shwayder Chemical Metallurgy Corp., U.S., has produced a new line of sintered tungsten carbide powders for hard-surfacing, abrasives, diamond settings, oil field tools, plastic dies, and other applications where a hard, wear-resistant material is required. The powders, in a cobalt binder for extra toughness and wear resistance, are composed of primarily sintered tungsten carbide with small amounts of titanium and tantalum carbides. The trade name is "Microcarbide".

INDIUM FROM ZINC SLAG

Indium is among the products of Consolidated Mining and Smelting Co. of Canada. The production process consists of treating slag from zine plant (after further removal of lead and coper) in an arc-resistance furnace with a reducing agent. The resulting metal contains lead, tin, arsenic, antimony, copper, iron, and indium, and each is removed in stages.

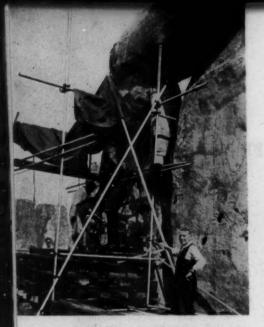
The arsenic is removed as a speiss, tin and lead by electrolysis when the indium is subsequently dissolved in sulphuric acid. Any copper is removed by electrolysis and the indium precipitated by aluminium in zinc. It is further purified by melting, electrolysis and remelting.

RECOVERING HEAVY ACCESSORY MINERALS

Mr. F. A. Williams recently presented a paper to the general meeting of the LM.M. entitled "Performance Analyses of Screens, Hydrocyclones, Jigs and Tables used in Recovering Heavy Accessory Minerals from an Intensely Decomposed Granite in the Jos Plateau, Nigeria".

In this paper, the author described how methods of quantitative fragmental petrography originally devised for the physical analysis and valuation of various intensely decomposed granites have been employed for investigating the recovery in a gravity plant. Performance analyses given by the author indicate the efficiencies of hydrocyclones, jigs and tables for recovering minerals in various size ranges.

A great deal more along similar lines and possibly with new techniques could be carried out by way of investigating the performances of many plants, and the methods are worth close study for those who are concerned with the studying of plant performance.



Reconstruction work being carried out at Stonehenge by the Ministry of Works involves equipment recently developed by L. M. Van Moppes and Sons (Diamond Tools) Ltd.

Yugoslav lead exports in the first half of this year decreased to 27,238 tons, worth 1,861,000,000 dinars, from 34,613 tons, worth 3,187,000,000 dinars in the corresponding period of 1957.

According to reports from Bonn, Greece is seeking West German assistance for the planning of certain major industrial projects. Their cost will be about \$25,000,000 and include an aluminium factory, the Acheloos River hydroelectric project, a ferro-manganese industry, and a soda and magnesium plant.

One of two new graduate research fellowships announced by the Lead Industries Association of New York will deal with the use of lead in ferroelectrics and will be at the University of California, Berkeley. This brings the fellowships in ceramics supported by the Lead Industries Association to a total of nine, during the academic year 1958-1959.

Soviet geologists have discovered rich uranium deposits in Bulgaria, and at Silven the strike was said to be so rich and extensive that the whole area had been cordoned off. Large deposits of cobalt have also been discovered.

Metallurgical studies to develop efficient methods for separating and recovering nickel and cobalt as separate. products, and for preparing extremely high-purity nickel, will receive special attention at four research stations of the U.S. Bureau of Mines during the fiscal year beginning July 1, 1958.

Preparations are being made to mine halloysit in the area of Michalovce, Eastern Czechoslovakia. Geologists estimate the deposit to amount to 2,900,000 tons. Halloysit can serve as a substitute for kaolin.

The output of gold in the French Cameroons increased from 13.4 kg. in 1956 to 339 kg. during 1957. Except for 24 kg. produced by Compagnie Minerai du Cameroun, the mining was entirely by individual Africans.

MINING

The reconstruction work being undertaken at Stonehenge has involved the use of equipment recently developed by L. M. Van Moppes and Sons (Diamond Tools) Ltd. One of the stones was drilled by diamond set bits. In reinforcing the cracked stone, three 1½-in, holes were drilled with Diatube to a depth of approximately 40 in. There was no appreciable vibration which might have affected the structure. Subsequently, 3-in, dia. counterbores were drilled at each end of the three holes. The work will permit the insertion of non-corrosive tie rods and their subsequent covering with stone blocks.

The Freeport Sulphur Co.'s nickel plant in Cuba should be able to commence production by the summer of 1959.

Canadian Malartic Gold Mines and Barnat Mines will shortly launch a joint surface drilling programme to probe their common boundary for a repetition of the big porphyry-type gold orebody recently found nearby on the latters' ground.

The only large mining company now working in Fiji is Emperor Mines Ltd., which has for some time past been obtaining good results from development work at depth and to the east of the original workings. The Fijian Government has now agreed to grant a subsidy to the company on the gold production of its operating company, Emperor Gold Mining Co. Ltd. The subsidy will be in force for three years from June 19, 1958, and will be at the rate of £2 (Fijian) per oz. of gold to a maximum of £150,000 (Fijian) annually. A condition will be that the company be subject to Fijian income tax and royalty levies. The company considers that the subsidy will materially contribute towards the development of the mine at lower levels.

One of the final stages in the electrification of the Kalgoorlie mines, Australia, has been the conversion of some of the large winders on the older mines from steam to electric drive. Great Boulder is converting two winders, and Lake View and Star has commenced the conversion of the winder at Chaffers Shaft, the deepest on the Golden Mile at 4,168 ft. A new headframe with facilities for skip hoisting is to be erected. Cost of the completed changeover is estimated at £A300,000.

The Massena smelting operations of Alcoa have provided the first industrial consumption of electricity from the St. Lawrence project of the Power Authority of the State of New York. New facilities were built at the Massena plant to accommodate the Authority's power. The two new potlines will together have an initial capacity of 54,000 tons of aluminium annually. The second potline is due to commence production on October 15.

South African diamond sales from local and outside sources totalled £29,200,000 in the first half of this year compared with £37,700,000 during the comparable period.

After an inflow of water into the underground workings, the West Midlands Divisional Coal Board has decided to close down Beech Tree Colliery, Worcestershire, immediately. The annual output of the colliery was about 66,000 tons, and its expected life from four to five years. The quantity of coal lost will be less than 500,000 tons.

It is reported from Russia that 33,517 tons of coal were won during August by a single Donbas cutter in the Karaganda coal basin.

New bids are to be invited by the Philippine Government for the exploitation of the Surigao nickel deposits following the enactment of Republic Act 1828 under which the government expects to be able to issue a more attractive offer to foreign investors. It is estimated that development of these deposits will require investment of from SU.S.150,000,000 to \$U.S.200,000,000.

A permanent mission of French coal mining engineers is to be established in Buenos Aires and at Rio Turbio, in Argentine Patagonia, to carry out a contract aimed at increasing coal output at Rio Turbio from the current 300,000 tons a year to 2,000,000 tons in 1963. A contract signed between Sofremines, a technical subsidiary of the French State Collieries, and Yacimientos Carboniferos Fiscales, the Argentine State Coal Authority, provides for an investment worth \$42,000,000 in coal mining equipment. Sofremines will train 30 Argentine technicians in French mines over a three-year period.

Large-scale copper deposits have been located in Chekiang. China, and on the Kilien mountain in Chinghai. A deposit of nickel has also been identified in the latter area. In Yunnan an iron deposit estimated at 100,000,000 tons has been discovered, while a new coal find in the the same district is said to contain 2,200,000,000 tons. A 20,000,000 ton deposit of asbestos has been found in Szechuan.

Coal reserves in the Chaochuang coal mining area of Shantung Province, China, are estimated at 600,000,000 tons. Present production is running at about 4,000,000 tons annually but is expected to rise to 8,000,000 tons in 1959.

The discovery of copper in the Halls Bay area of Newfoundland and of several small high-grade copper deposits is reported in the fifth annual report of the British Newfoundland Corp. The report also says that the number of joint ventures into exploration sharply increased, and six leading companies

MISCELLANY

shared in the exploration of nine areas ranging from 60 to 2,500 sq. miles. In Labrador, the partial examination of the Kiglapait Mountain coastal area disclosed an extensive horizon of titaniferrous magnetite. The report adds that for the coming years work will be concentrated in three areas shown to have the maximum mineral potential, namely: Kaipokok-Makkovik in Labrador, and Halls Bay and the Bay of Islands areas of Newfoundland.

The Sicilian Regional Assembly has approved a Bill for the appropriation of \$2,000,000 to boost mineral prospecting in Sicily.

PERSONAL

Mr. H. S. Blackman has retired from the Board of Barrow Hepburn and Gale after approximately 45 years' service with the company and its predecessor.

Mr. Raymond E. Lapean has been appointed regional director, Europe, of

Cyanamid International. Mr. Lapean has served for the past six years as managing director of Cyanamid of Great

Mr. W. M. Warren has resigned from the boards of the following companies owing to ill health: Amalgamated Tin Mines of Nigeria, Ampat Tin Dredging, Anglo-Oriental and General Investment Trust, Esperanza Copper and Sulphur Co., London Tin Corp., and Southern Kinta Consolidated.

Dr. M. F. Jordan has joined Murex Welding Processes Ltd. as leader of the fundamental research section of the research department. He succeeds Dr. W. D. Biggs, who has left the company to take up an appointment in the engineering department of Cambridge University. Mr. H. J. Wellard has also joined the fundamental research team at

Mr. E. C. Arbuckle, Dean of Stanford University Graduate School of Business,

U.S., has been elected a director of the Western Machinery Co. of San Francisco.

The Purchasing Officers' Association is holding its 1958 Conference and Mini-bition at Southport from October 2 to October 5. Over 100 firms, drawn from all sections of British industry, will be exhibiting at the Minibition.

CONTRACTS AND TENDERS

Taiwan (Formosa)

Twenty-four units power feed drifters, 20 units drill mounting boom and air motor-driven pumps for use with drifters, one lot drill rods, 4,000 bits 13 in. Issuing authority, Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan (Formosa). Closing date for bids, October 2, 1958. Ref. E.S.B. 21832/58 I.C.A. Telephone inquiries to Chancery 4411, extension

Sand scraper loader, pontoon and sand pump, armoured cable, mono-cable aerial ropeway, steel bunker. Tenders to the Chief Purchase Officer, National Coal Development Corporation (P.) Ltd., Darbhanga House, Ranchi. Closing date, October 29, 1958. Ref. E.S.B. 21587/58. Telephone inquiries to Chan-cery 4411, extension 738 or 771.

South Africa
Tungsten carbide tipped rock drills, hexagonal hollow steel and other equipments. Issuing authority, Cape Provincial Administration. Closing date for bids, September 26, 1958. Ref. E.S.B. 21593/58. Telephone inquiries to Chancery 4411, extension 738 or 771.

Taiwan (Formosa)

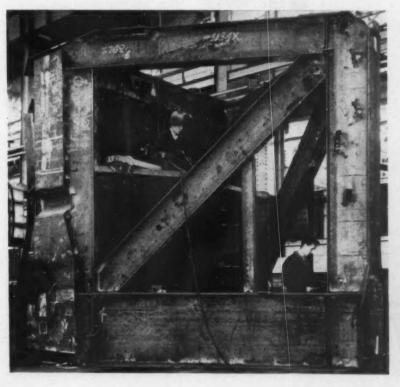
One set axivane or propeller type fan, 5 sets enclosed 50 h.p. motor, 16 pneumatic rock drills, 1 horizontal type compressor. Bids to Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan (Formosa). Closing date, October 3, 1958. Ref. E.S.B. 21834/58 I.C.A. Telephone inquiries to Chancery 4411, extension 354.

Two contracts with the U.K. Atomic Two contracts with the U.K. Atomic Energy Authority have been announced in Australia for the sale of uranium oxide. United Uranium N.L. has contracted for the sale of existing reserves of uranium oxide and for the development and sale of a substantial quantity of ore to a total value of £5,000,000. The contract entered into by South Alligator Uranium N.L. covers existing and future reserves of ore to the value of £1,150,000 £1.150.000.

six-year contract for the production A six-year contract for the production of 1,200,000 tons of coal from the Royal Arms opencast coal site near Merthyr Tydfil has been awarded to Taylor Woodrow Construction Ltd. by the N.C.B. Opencast Executive. A total of 22,800,000 cu. yds. of excavation will be carried out.

An agreement has been signed giving Tilghman's Ltd. sole selling rights in the British Isles of the range of pneumatic tools manufactured by Gebr. Bohler and Co., Vienna. This range includes tools for the metal-working industries, mines and quarries. To adequately cover the ground opened up by the new line, Tilghman's have inaugurated a Pneumatic Tools Division at 1 Chester Street, London S. W. 1 London, S.W.1.

Welding work in progress on part of the revolving superstructure frame for a Rapier W1400 walking dragline in the Glasgow works of Sir William Arrol and Co. Ltd., who, for this part of the machine, are acting as sub-contractors to Ransomes and Rapier Ltd., designers and manufacturers of the dragline. The welder is using a Vertend electrode, product of Rockweld Ltd. When completed, the dragline will be the largest in the world and will be used for opencast iron ore mining at Corby



Machinery and Equipment

New Version of Lightweight Rock Drill

Designed as a miniature rock drill weighing only 7½ lb., the new version of CP9, known as the CP9F, now being produced by the Consolidated Pneumatic fool Co., is a fully self-rotating percussive hand drill with a wide range of application from drilling plug holes for survey points, secondary blasting, fixing and securing of installations, to chipping and chasing and sample cutting.

Features include a new rotating chuck, a quick-change steel retainer for rotating dril steels or non-rotating chisels, a new type valve which ensures maximum drilling speed and powerful rotation with low air consumption, a built-in oiler ensuring adequate lubrication, and a right- or left-hand exhaust, threaded so that a blower hose may be used where necessary. The hollow-type rotating drill steels supplied enable a jet of air to be directed to the drill point, keeping it cool and also removing dust and chipping and preventing packing.

Both rotating hexagon-shanked drill steels and round-shanked non-rotating chisels are retained by four balls in the rotating chuck. Steels are released by pulling back the spring-loaded chuck sleeve and withdrawing the drill or chisel. Overall length of the tool is 14½ in.

WORLD'S LARGEST EARTHMOVERS

This month, R. G. LeTourneau Inc. introduces the largest self-propelled earthmoving scrapers ever placed on the market. R. L. LeTourneau, vice-president, disclosed that the first units will be in the 70- and 125-ton class—roughly equivalent to 50 and 100 cu. yd. capacity. This is in contrast to conventional scrapers which average 15 cu. yd. capacity, with some few going to 35 yds.

First public showing of one of the new 70-ton units will be at the American Mining Congress, set for September 22 to 25 in San Francisco. Significantly, it will be the first showing of any earth-



Above: The new version of the CP9 rock drill, designated the CP9F, a 7½-lb. machine produced by C. P. Tool Co.

Below: A sketch of the world's largest earthmover to be shown during late September at the American Mining Congress in San Francisco moving machinery by LeTourneau since selling out its previous line in April. 1953. The company ended a five-year absence from the business in May of this year. The new self-propelled scrapers are the latest step in the development of this type of machine, originally pioneered by LeTourneau in 1938.

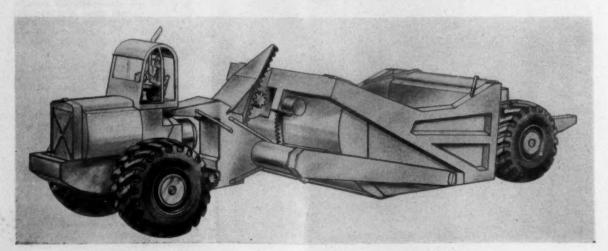
The first unit is being introduced at the mining show to demonstrate its application for large-scale strip mining operations. The major difference between the powerful, super-sized scraper and conventional scrapers is that each wheel of the new machine will have an individual electric motor geared directly to its inner rim, thus providing greater traction and working power under the payload than has ever before been attainable. (See Mining Journal, August 8, page 151.) Power is supplied by the machine's 600-h.p. diesel-electric dynamo.

A RUBBERIZED PUMP

The pump and impeller on No. 12 mill, Nchanga, Northern Rhodesis (which was installed to handle Chingola Open Pit ore), was made of iron. Within two weeks of the mill starting up, the pump was worn out. This was understandable, because the material passing through the pump is highly abrasive.

But to write off a pump in so short a period was uneconomic. Denver Equipment Co.'s local representative was consulted regarding the advisability of installing a DRL 10 in, by 8 in, soft rubber lined pump to do the job. The only readily available screen had an aperture measurement of ½ in, by ½ in., which meant that the material passing through the pump would have been of a coarseness that had hitherto been considered far too abrasive.

Two and a half months ago, the pump was set in motion, and it is still going well. A recent examination of the impeller and bearings revealed no appreciable wear.



Metals and Minerals

No Boom for the Rare Earths

Much work is being done on the properties of the rare earths and their compounds and in application research.
Warnings from America, however, stress
the dangers of over-optimism. Though
a growing number of minor applications
is foreseen, there is at present no indication that usage for any particular application is likely to increase very greatly in the near future. Only through elaborate studies can a bright commercial future he realized for the rare earths.

There is no dearth of rare earth minerals, but workable deposits are rather scarce. Current enthusiasm in America is attributed largely to the development of improved methods for extracting the metals and compounds from their ores and separating them from one another.

Improved processing methods and increased production have unquestionably improved the outlook for the rare earths by leading to substantial price reductions. For instance, during the past decade the price of cerium metal in the United States has fallen from \$50 a lb. to \$24, that of thulium oxide from \$2,800 a gm. to \$13.35 a gm. Yet the cost of individual rare earth elements and compounds still remains high as compared with that of most chemicals in industrial use, though certain mixtures may be competitive. The point now appears to have been reached at which costs cannot be reduced much further unless demands increase, while demand is unlikely to improve until prices come down. In considering the economics of production. however, the possibility has to be borne in mind that the cost of processing the whole group might be borne by a single member of the group for which a profit-able demand had been developed.

Considerable effort is currently being expended to promote uses of the rare earths in suitable proportions in order that eventually they may all become available at economic prices. Some time ago, seven important United States metal and mineral companies formed a group to sponsor research at the Battell Memorial Institute of Columbus, Ohio-Battelle a step which would certainly not have been taken without some grounds for

reasonable optimism.

Cerium, the most abundant of the rare cerium, the most abundant of the rare earths, is now being produced in very high purity by the Bureau of Mines, U.S. Department of the Interior. The ultrapure metal will absorb great amounts of the impurities which are present in other metals when molten. This application might help to produce better high-temperature alloys for missile applications. Ultra-pure cerium also has three times the electrical conductivity of the comthe electrical conductivity of the com-mercial grade. It might therefore be used in the production of special alloys for electronic and automation devices. Another possible application envisaged by the Bureau of Mines is as a flame-sprayed coating for metals and alloys used in making nose cones.

There have been numerous rumours regarding the possible commercial use of rare earths in the manufacture of carbon steel. It has been stated that, when used as a ladle additive, they produce a cleaner steel and probably speed up the

steel refining process. A number of steel companies are experimenting with the use of rare earth oxides, but the experiments are not yet conclusive, and it is possible that the same results might be achieved by using double salts of some more common metals, such as sodium and calcium.

According to Dr. Richard C. Hines, research specialist at Battalle, yttriumiron garnets, as well as other rare earth materials, show promise for use as magnetic-core materials in microwave and television applications. The rare earths have also been tested and found useful as activators in phosphors. Special phosphor needs will multiply greatly as newer developments, such as wall-panel lighting, become household items. Research results also indicate that several rare earth materials may be of special value in the nuclear field. These materials possess proper ties that may make them valuable in reactor control and shielding problems.

Rare earth materials, which are already being used by ceramists in polishing agents and in special glasses, may find another area for development in high-temperature refractories. Some of the needs for high-temperature metals may have because the materials of the second of the second of the needs for high-temperature metals may also be satisfied by rare earth metals and

their alloys.

The oxides of a number of the rare earths have been reported to exhibit catalytic activities, particularly in dehydration and dehydrogenation reactions. The rare earth metals themselves have also been considered as potential cata-

PROGRESS AT CAPE YORK

In a recent statement by Mr. D. Hibberd, director of the Commonwealth Aluminium Corporation, it was revealed the Corporation had already established the existence of 200,000,000 tons of economic grade bauxite in the Corporation's Weipa deposits on the Cape York Peninsula in the North of Queens-land. This reserve alone is equivalent to about 12 years' Free World production of bauxite based on 1957 output. The Gove Peninsula area also is thought to hold promise of adding a further con siderable tonnage to available bauxite reserves for this vast new project.

It will be recalled that the Commonwealth Aluminium Corporation is an undertaking in the conduct of which the Consolidated Zinc Corporation is associated with the British Aluminium Co. sociated with the British Aluminium Co. Last December an agreement was negotiated with the Queensland Government under which the Corporation is to develop and operate this field for a period of 84 years. Under the agreement the Corporation undertook to establish an alumina plant in Queensland as soon as was practicable. It now ap pears that the construction of a 500,000ton capacity plant is envisaged involving a capital outlay of about £A45,000,000.
Revenue from the sale of this output overseas is estimated at about £A15.000.000 per annum.

The progressive establishment of aluminium smelting facilities to produce 250,000 tons of metal annually would absorb £A200,000,000 or more of capital. depending on the type of power plant chosen. The alternative power schemes involve hydro-electric power from the Purari River in Papua, to be transmitted 245 miles from point of generation to a port and factory 60 miles west of Port Moresby; or alternatively, low-cost Moresby; or alternatively, low-cost steam-generated power on the very large black coal deposits at Blair Athol, in Central Queensland, 135 miles in a direct line from the coast, and where reserves appear to approximate 200,000,000 tons of coal of 11,800 B.T.U.

The development of an integrated aluminium industry based on these re-sources will require facilities for mining and beneficiating bauxite, a plant for ex-tracting alumina and a smelter for the production of metal from the alumina as well as township facilities.

It was emphasized that the trend for the mining industry, which was once re-garded as the province of risk capital alone, seemed likely to involve a sub-stantial shift to debenture and other forms of borrowing.

BISMUTH METAL IN 1957

In 1957, users of bismuth in the United States consumed 800 s.tons of metal, nearly 7 per cent more than the quantity consumed in the previous y according to the Bureau of Mines, U.S. Department of the Interior. The increase is attributable to expanded uses in fusible bismuth alloys and in experimental devices. Bismuth consumed in alloy fabrication accounted for 64 per cent, the bulk of the remainder being consumed in pharmaceutical applications.

Nearly all primary bismuth metal produced domestically in 1957 was a byproduct of lead refining of bullions that contained bismuth as an impurity. The bullion, in turn, was derived from processing both domestic and foreign ores. The Bureau of Mines is not free to publish the quantity produced, but states that after increases of 24 and 38 per cent respectively, in 1955 and 1956, the rate of production in 1957 remained virtually

unchanged.

Stocks of metallic bismuth held by consumers and dealers rose by 52 cent during the year to 174.2 s.tons. This quantity is the largest recorded in the seven years that the Bureau of Mines has assembled bismuth stock data. Stocks at domestic refineries increased very little during the year. Deliveries to Government account, though slightly lower than in 1956, were large enough to lessen the effects of oversupply and maintain a degree of stability in business transactions.

Refined metal from foreign sources totalled 424 s.tons in 1957, a decrease of 8 per cent from the all-time peak of 1956, but 75 s.tons above the average annual import level of 1953-57. Peru was by far the dominant contributor, furnishing 66 per cent of the total. Mexico came

second in quantity with 25 per cent, with Yugoslavia, Canada, and the Netherlands supplying the remaining 9 per cent. In addition, substantial quantities of bismuth entered the United States as a constituent of ore concentrates, base metal bullions, and impure bismuth-lead bars. This category of imported bismuth was estimated by industrial sources to have been 100 s.tons in 1957

The Bureau of Mines estimates total world production of bismuth last year at 2,400 s.tons compared with 2,650 s.tons in 1956.

In the first quarter of the current year, consumption of bismuth in the United States declined 18 per cent from the preceding quarter. Consumers' use of 140.2 s.tons was 37 per cent under the first quarter of 1957 and the lowest recorded since the INIVS appropriate period. corded since the July-September period of 1956. Consumers' and dealers' stocks increased for the third successive quarter and on March 31 were slightly above 200 s.tons, a level 15 per cent greater than the material on hand at January 1. Imports in January-March, 1958, totalled 95.8 s.tons compared with an average quarterly total of 106 s.tons in 1957.

U.S. STOCKPILE BUYING

A recent directive to the General Services Administration, from the office of Civil and Defence Mobilization, lists amozite, asbestos, small diamond dies, muscovite, block and film mica, as items to be purchased from foreign or domestic sources in the current fiscal year to June 30, 1959. This directive applies only to purchases for the national strategic stockpile, and the statement points out that items might also be purchased for supplemental stockpiles by the Commodity Credit Corporation.

Certain materials already held in the strategic stockpile are to be upgraded, notably: oxygen-free copper, ferro-molybdenum, ferro-vanadium, molybdic oxide and tungsten carbide powder.

MANGANESE IN INDIA

The Indian Government has an-nounced further temporary concessions During the manganese exporters. month of September ad hoc shipments will be permitted against 1957-58 quotas subject to quota holders having satisfied the control authorities by Wednesday, September 10, 1958, that the shipments are being made under contracts con-cluded before July 1, 1958, and that the ore shipments themselves were either lying in port or on rail prior to this date. This concession is, in effect, an extension of a similar concession announced earlier and provides some further indication of the slack conditions obtaining in this market.

COPPER TIN ZINC LEAD

(From Our London Metal Exchange Correspondent)

During the week price movements have been relatively small and the main talk-ing point has been the tin market. The copper, lead and zinc markets have been marking time, awaiting the communiqué which has been promised at the end of the present meeting, which is being held in London and at which some forty countries are represented. Also, political events in the Far East have been to a large extent balanced by reports of the probability of some industrial recession in the U.K. and European countries during the autumn.

TIN STILL UNDER PRESSURE

The tin market this week has been subjected to fairly heavy pressure owing subjected to fairly heavy pressure owing to sales of cash metal originating from a quarter which is believed to handle Russian metal, and this, combined with renewed doubts as to whether the recent action by the U.K. Government will, in fact, prevent the whole buffer scheme from breaking down, has given rise to the development of a small backwardation. Sentiment was also not helped by a sharm rise in the stocks in official warea sharp rise in the stocks in official ware houses, which now amount to 17,152 tons, an increase of 679 tons over the figure for the previous week.

The situation was not improved by a report from Tokyo that the Japanese would be perfectly prepared to buy Russian metal at the expense of Malaya if the price was cheaper. At present, Japan imports about 7,000 tons of tin yearly, most of which comes from Malaya. The Indonesians, however, have

reaffirmed their loyalty to the International Tin Agreement and have denied reports that they have been shipping metal to Russia or China outside the Agreement.

The Malayan Minister for Commerce and Industry has also said that he would visit London after the Montreal Conference to discuss the problems facing the International Tin Council. He said he considers it essential for the present Agreement to succeed, not only for the sake of the tin world but also for the sake of any other stabilization schemes for other commodities which might be proposed in the future. Indonesian tinin-ore shipments in July totalled only 884 tons, against 1,668 tons in June. Again, shipments were destined to London with other port options.

On Thursday morning the Eastern price was equivalent to £747½ per ton c.i.f. Europe.

NO SCHEME FOR COPPER

The copper market has been less active than of late, but prices have been maintained in view of the possibility of a strike in the Rhodesian Copperbelt. The result of the strike ballot indicated an overwhelming majority in favour of such action, and thus the Council of the Union is now empowered to bring one about should it be considered necessary.

It is understood that the chairman of the International Conference taking place in London is Sir Herbert Brittain, of the United Kingdom, and the vice-chairman is Sir Edwin McCarthy, of Australia. The communiqué issued at the end of the session on copper shows that the majority opinion is that the copper situa-tion has now righted itself and that no governmental intervention is desirable. It also stresses the desirability of having better statistics available so that in the case of the need of a future conference, more up-to-date and accurate figures would be available to the members

Figures are now available which show that the production of the Roan Antelope mine for the year ended June 30 totalled 79,931 tons, as compared with 86,297 tons in the previous year. The 86,297 tons in the previous year. The output for the Mufulira copper mine totalled 92,904 tons for the year, compared with 99,793 tons for the previous twelve months. As an offset against these reductions, however, the Chibuluma mine's production amounted to 27,177 tons against only 14,494 tons for the year ended June 30, 1957.

In America, the output of recoverable copper was 12 per cent less than in May, and the production for the first six months of 1958 was lower than that for the corresponding period in 1957 by a similar percentage. Refined copper from similar percentage. Refined copper from secondary sources fell by 6 per cent when compared with the previous correspond-

In the United Kingdom, the stocks in official warehouses fell again by a further 461 tons to a total of 11,031 tons, and this is doubtless contributing to the fact that the prices for cash and forward metal are now similar. Although demand remains reasonably satisfactory, there are remains reasonably satisfactory, there are as yet no signs of any autumn buying developing, although some American sources report a slight pick-up. One of the main factors which is now looming over the market, apart from the strike already mentioned, is the possibility of trouble in the motor industry in America.

LEAD AND ZINC MARK TIME

The lead and zinc markets have been featureless, and as the International Conference is not dealing with these two metals until the end of the week, it is very doubtful if there will be any major developments. It is known that the Conference hopes to conclude its deliberations on Saturday, and presumably any communiqué which is issued on these metals will be available in time for the market on Monday morning, but what this is likely to contain is anyone's guess, as there is no information available as to the possible course of the discussions.

Closing prices are as follows:

	Sept. 4 Buyers Sellers	Sept. 11 Buyers Sellers
Copper Cash Three months Settlement Week's turnover	£206\(\frac{1}{2}\) £206\(\frac{1}{2}\) £206\(\frac{1}{2}\) £206\(\frac{1}{2}\) 6,600 tons	£206\} £206\} £206\} £206\} £206\} £206\} £206\} £206\} 8,250 tons
LEAD Current ½ month Three months Week's turnover	£712 £72 £722 £73 3,350 tons	£70½ £70¾ £71¾ £71¾ 3,500 tons
Tin Cash	£730 £7304 £731 £731½ £7304 1,160 tons	£730 £7304 £728 £7284 £7304 1,645 tons
ZINC Current ½ month Three months Week's turnover	£64½ £64½ £65 £65¼ 4,025 tons	£651 £651 £651 £652 5,200 tons

London Metal and Ore Prices appear on page 292.

Mining Finance

Dr. Verwoerd and Foreign Capital

It is a characteristic of South African politics that since the time of General rierzog each succeeding prime minister has been viewed on this side of the equator as more isolationist and less amenable than his predecessor. This was once more apparent in the Kaffir market's reaction when Dr. Verwoerd succeeded Mr. Strijdom. Nevertheless, measuring deeds performed in office against words spoken beforehand, it appears that responsibility, like music, has certain powers.

Certainly Dr. Verwoerd has lost no time in making his position clear, and his welcome remarks on foreign capital mark a definite advance on what might have been anticipated by reference to his political record. It was gratifying, he said, that the Union today provided by far the greatest proportion of its own capital requirements. Nevertheless, foreign investment was still of prime importance, and in many cases desirable development could only take place with the technical knowledge and business skill that accompanies foreign capital. For that reason the government would continue to welcome foreign investment in the rich resources of the country, provided that it did not conflict with the general principle of a country retaining control over its economic destiny.

Dr. Verwoerd acknowledged that some foreign capitalists might prefer subsidiary companies to other less direct forms of control. This was still welcome, he said, but it was to be hoped that eventually South African capital would be invited to participate in such ventures.

As an example of the kind of investment particularly welcomed by South Africa, Dr. Verwoerd cited the American-South African Investment Co., which, he said, had undertaken not to invest in existing companies to the extent of exercising control. This statement would seem to put an end to speculation suggesting that the new trust might, in fact, be a new finance house in embryo. Nevertheless, it should be remembered that, with few exceptions, the gold mines of South Africa are not financial subsidiaries of their respective finance houses, although in practice the groups are certainly in control of their affiliated mines.

American - South African has itself been in the news again this week. As will be remembered, the portfolio (analysed in this column last week) was to be paid for on a basis of average market prices between June 16 and September 5, with the period September 2 to 5 given additional weight in the calculation. The answer to the sum has come out at a little over £8,000,000. Thus both buyer

and seller in this transaction can look on the deal as satisfactory, the Trust because its portfolio already shows an appreciation of about £350,000 over the purchase price, and the Houses because of the substantial profits over book values that will be realized.

THE END OF THE LONG DECLINE?

The quarterly results of the three Rhodesian Selection Trust copper producers are neither better nor worse than was to be expected; although share prices are discounting a lot more than the slight recovery which has taken place, it remains encouraging to see any increase in earnings after the succession of declines over the past eighteen months or so. Salient features of the reports appear below.

	(000 tons)	Profit (£000)	Cost per to: (£)
Roan Antelope	2:		
Dec. '57 Mar. '58	18.9 19.9 18.7 19.9	643 512 288 529	145 138 131 125
Dec. '57 Mar. '58	21.9 23.2 22.1 21.7	1,092 1,068 622 908	128 136 140 135
Dec. '57 .	5.2 5.3 7.7 9.0	363 222 126 282	115 104 101 116
Dec. '57 Mar. '58		908 801 447 726	

A glance at these figures will reveal the gratifying fact that production costs per ton have fallen (Chibuluma excepted, because a large proportion of the output from that mine during the year has come from stockpiled concentrates which appear to be nearing exhaustion). Falling costs at the same time as a rise in the copper price is unusual, because a substantial proportion of costs—including the employees' copper bonus and Chartered's royalty—is linked directly or indirectly to the metal price. In fact, allowing for such cost elements, the real fall in production costs is probably nearer £10 per ton than the £6 quoted in the table. This is a measure of the success which the Copperbelt mines are achieving in their efforts to increase efficiency.

efficiency.

It is to be hoped that the European Mineworkers' Union, who, it appears, may obstruct any further advances in this direction, will yet realize that its long-term interests lie in the same direction as those of the companies. Apart from this, it must be borne in mind that the R.S.T. mines are still maintaining their voluntary 10 per cent production cut. Thus, spare capacity to the extent of five weeks' output per annum must

LONDON MARKET HIGHLIGHTS

South African gold shares started the week in fine fettle. At last it seemed that Kaffirs were really moving. Although business was not as big as many would have liked, much satisfaction was felt when the F.T. Gold Share Index crept up to its best for two years.

Once more the Cape, with hopes of a No. 2 shaft reef strike in mind, sought for Free State Saaiplaas shares and lifted the price to a 1958 high of 17s. 14d. Welkom on rumoured U.S. buying also touched their best this year, and persistent demand raised Stilfontein to 44s. 9d.

Then two disappointments reversed the trend. The first came when the long-awaited gold and uranium development values in Hartebeest's deep-level shaft were announced. The values of 195 in. dwt. for gold and 17.98 in. lb. for uranium were considered disappointing by comparison with Hartebeest's ore reserves; the shares, which had been a buoyant 69s., fell quickly back to 66s.

The second disappointment concerned the Anglo American group of half-yearly O.F.S. dividends. It was not that the payments were poor in themselves, but rather that they were not so good as had been expected from recent Johannesburg forecasts. Free State Geduld, for instance, lost 1s. 3d. to 93s. 9d. on the 3s. payment, which although representing a rise of 1s. on the March dividend was not the 4s. that some quarters had looked for.

Elsewhere, Globe and Phoenix, the

Rhodesian gold producer, climbed steadily to the best for many years of 30s. following their second interim dividend.

Diamonds were notable for the occasional U.S. interest in "Casts" and also for the rise in De Beers, which was based on interim dividend hopes. Platinums edged higher on the hope that final dividend payments might be made shortly.

Rhodesian copper shares stayed remarkably steady in face of the mounting labour unrest along the Copperbelt. Some uneasiness was noted, however, when it became known that the miners strike ballot had registered an overwhelming majority in favour of a stoppage.

Similarly, Tins held fairly steady after their earlier dullness, despite the latest difficulties of the International Tin Agreement. Beralt, which had recovered from an earlier setback, tended to lose ground again on the view that there might well be no dividend from 1958-59 operations.

Otherwise, in a week of very few highlights, Consolidated Murchison staged one of their periodical revivals. The shares jumped 2s. 6d. to a high for the year of 37s. 6d. on talk that the September quarterly would show a useful increase in profits. Another factor was speculation that Murchison might provide a hedge should a deterioration in the Formosa situation cause a stoppage in antimony supplies from China.

exist at the mines and smelters, and should the metal position not warrant the reinstatement of the cutback, it might well be possible to make up tonnage lost through a stoppage of reasonably brief duration.

IS HARTIES AT ITS PEAK GRADE?

Unwise though it is to base assumptions on a single reef intersection, this week's strike at Hartebeestfontein. South Africa's second highest profit earner, must inevitably cause some disappointment. The intersection, which was at a depth of 6,256 ft. in the 2A sub-vertical shaft, averaged 5.65 dwt. gold and 0.52 lb. uranium over a channel width of 34.5 in., equivalent to 195 in. dwt. and 17.98 in. lb.

The 2A sub-vertical shaft is part of Harties' plan for exploiting the deeper north-western area of the mine. Hitherto,

all Harties' milled tonnage of about 85,000 tons monthly has come from the shallow south-eastern section via a long haulage and the No. 2 shaft, but with mill capacity now being increased to 100,000 tons monthly (implying the hoisting of something over 130,000 tons), ore from the north-west will become essential to the mine's economy. However, if the reef in No. 2A shaft is at all representative of the ore in the north-west, it would seem that channel widths in general are wider than in the south-east, which is cut off by a major fault.

There is further evidence of this in the results obtained five years ago in borehole HB-21. This hole was drilled to provide information for the sinking of No. 2 shaft, and although the shaft was eventually sited about 700 yds. to the north, it remains the only other source of information on the reef in this area, at least until development is under way from 2A shaft. An original and three

deflections were drilled, the values disclosed being 153, 158, 93 and 234 in. dwt. with complete core recovery in all cases save the last. More significant was the channel width, which varied from 25 to 28 in. This compares with widths of the order of 15 in. in the south-east of the lease area.

It is, therefore, apparent, that scope for the sorting which Harties has employed since milling commenced will be severely limited when ore is coming in quantity from the north-west. Indeed, the present milling width is about 28 in. which is barely greater than the lowest width so far encountered in this area. Early development from No. 2A subvertical will be watched with considerable interest. In any event, it seems likely that the present grade of 11 dwt. per ton is as high as is likely to be achieved.

inal and three FIRST O.F.S. FINALS

In spite of what was said in this column two weeks ago, the first of this autumn's declarations by the O.F.S. gold mines contains the usual proportion of surprises.

One such came from Western Holdings, which is to pay 4s. compared with 3s. in each of the two previous half-years. This is as high as the best expectations, and higher than most. President Steyn, on the other hand, has declared a dividend of 1s. 3d., the same as last March, which effectively reduces the year's total to 2s. 6d. from last year's 2s. 9d. Free State Geduld is increasing its payment to 3s. This is somewhat below some recent guesses, but is nevertheless satisfactory.

The latest declarations are summarized below, together with the three previous half-yearly dividends for comparison.

Mar. 1957	Sept. 1957	Mar. 1958	Sept. 1958
s. d.	s. d.	s. d.	s. d.
F. S. Geduld -	1 0	2 0	3 0
P. Brand 2 6	2 6	2 6	2 6
P. Steyn 1 3	1 6	1 3	1 3
W. Hold'gs 2 0	3 0	3 0	4 0
Welkom	3	3	3

Two companies closely linked with the new mines of the Orange Free State—Blinkepoort Gold Syndicate and Lydenburg Estates—also declared their final dividends this week, accompanied, in the case of Lydenburg, by preliminary results for the year.

The Lydenburg portfolio includes 100.000 shares in President Steyn, just 115,000 President Brand, and 113,240 Welkoms. As was to be expected, last September's maiden declaration by Welkom has put the profit up (year to June 30 last, £48,638; 1957, £36,487, both gross), but a rise in the charge for taxation from £19,084 to £25.838 coupled with the necessity of providing £9,060 against depreciation of investments, has meant that income available for distribution is, in fact, less than last year. The recommended final dividend of 3d, per share is unchanged while the carry forward is increased by £8,740.

The dividend from Blinkpoort, whose fortunes depend almost entirely on a large holding in F.S. Geduld, continued the improvement which has been maintained since Dividend No. 2 of 2½d, per share was declared in 1957. Since then, the half-yearly dividends have been: No. 3, 8½d.; No. 4, 1s. 3d.; and now No. 5, 1s. 7½d.

Rand & Orange Free State Returns for August

	1050								Last Financial Year		
Company	Tons Yield (000) (oz.)		Profit† (£000)	Year ends	Tons (000)	Yield (oz.)	Profit† (£000)	Tons (000)	Yield (oz.)	Profit (£000)	
Goldfields Doornfontein Libanon Luipands Vlei Rietfontein Robinson Simmer & Jack Sub Nigel Venterspost Vlakfontein Vogels West Drie	98 70 21 77 90 66 133 50	36,163 23,123 12,035 4,808 16,016 16,950 16,116 32,592 17,674 21,114 76,626	190 · 7 54 · 1 5 · 1 11 · 1 3 · 0 13 · 5 26 · 2 61 · 3 85 · 8 42 · 8 624 · 9)) D D D 1)	174 196 140 176 578 698 132 261 396 765 160	72,916 45,954 24,271 40,020 123,445 133,766 32,109 64,413 139,738 171,391 152,636	387 · 1 109 · 5 10 · 2 103 · 1 40 · 2 113 · 6 52 · 9 121 · 2 677 · 1 350 · 9 1249 · 4	170 204 150 195 603 767 132 249 396 789 150	69,462 45,679 26,535 45,251 123,077 141,846 33,520 59,938 141,855 182,921 143,473	373 · 3 106 · 9 L11 · 2 129 · 5 74 · 7 149 · 3 54 · 4 123 · 6 683 · 0 553 · 4 1230 · 5	
Anglo American Brakpan Daggas East Daggas F. S. Geduld Loraine President Brand President Steyn S. A. Lands Springs Vaal Reefs Welkom Western Holdings West Reefs Ex.	242 94 72 74 98 98 98	16,563 49,730 15,486 51,781 14,622 72,173 37,510 18,853 15,150 35,036 27,111 56,359 27,120	13·1 264·4 30·6 365·8 1.21·7 600·4 200·4 200·1 78·4 415·3 71·3	D D D S S S D D D S S D D	994 1,848 729 729 741 891 1,046 713 1,014 569 938 1,069 895	132,481 384,645 120,878 522,294 140,362 664,340 433,557 155,949 113,850 256,289 277,378 578,151 210,730	98 · 4 2011 · 0 225 · 6 3609 · 9 L212 · 7 5398 · 0 2236 · 6 419 · 3 771 · 6 4974 · 6 501 · 3	857 1,826 759 582 691 695 1,002 722 1,012 481 481 1,042 977	146,146 400,604 125,477 610,750 134,466 528,879 384,653 153,506 110,201 211,332 199,176 488,464 212,111	105 · 6 2194 · 2 277 · 0 1931 · 2 169 · 1 4342 · 1 2184 · 3 516 · 5 553 · 0 3303 · 3 517 · 6	
Central Mining Blyvoor City Deep Cons. M.R. Crown D. Roodepoort East Rand Prop. Harmony Modder East Rose Deep	117 129 237 189 231 92	67,858 24,049 20,792 35,353 34,120 57,326 36,811 13,373 6,732	490·4 14·3 12·9 15·0 53·3 145·0 137·9 1·5 0·4) D D D	211 1,057 265 1,839 1,450 1,687 177 282 455	134,825 206,361 41,879 279,598 262,171 453,812 69,527 27,134 59,301	970-9 78-3 26-2 124-5 406-4 1185-7 258-2 3-5 24-6	216 1,187 338 1,915 1,468 1,745 177 289 397	128,352 234,233 48,294 279,068 257,536 449,353 70,369 29,052 60,180	938·0 135·1 20·0 L6·7 412·1 1035·7 371·3 8·0 3·0	
J.C.I.º E. Champ d'Or. Freddies Cons. Govt. G.M.A. Randfontein	13 58 62 26	354 14,933 11,501 3,951	L28·1 L49·9 0·1 5·1	D D D	99 417 499 230	2,514 121,268 88,310 36,504	L218·2 L305·9 8·0 40·6	97 466 838 576	2,719 121,457 141,249 95,991	L212·4 L141·2 L64·0 77·6	
Union Corp. East Geduld Geduld Prop. Grootylei Marievale St. Helena Van Dyk	131 75 200 72 124 78	40,284 12,942 42,527 18,901 36,321 14,256	278 · 6 14 · 4 215 · 0 84 · 2 197 · 4 23 · 6	D D D D D D D	1,020 632 1,570 569 940 609	313,675 102,268 334,294 149,313 276,011 112,055	2139 · 7 77 · 1 1702 · 0 660 · 5 1380 · 0 202 · 4	1,108 804 1,561 571 932 623	340,112 127,464 334,005 149,873 271,516 106,467	2399 · 5 204 · 6 1760 · 1 674 · 1 1499 · 2 67 · 1	
General Mining Buffelsfontein Ellaton S. Roodepoort Stilfontein W. Rand Cons.	32 29 122	39,884 7,470 6,905 59,597 18,935	183·5 32·6 23·2 400·3 17·4) D D	235 256 60 899 1,123	79,056 59,426 14,227 444,191 146,543	366·0 252·7 49·3 2862·6 118·7	222 261 61 794 1,146	72,614 56,000 14,191 352,546 165,576	352·7 141·6 52·3 2256·8 -131·6	
Anglo Transvaal Hartebees Ontein N. Klerks orp Rand Lease Village M.P. Virginia O. S.	87 10	47,415 1,067 26,370 4,823 28,350	313·2 L8·5 9·7 2·0 46·5	1 0 1	174 81 354 56 213	94,830 8,682 51,948 9,516 55,545	627·6 L63·2 17·3 4·0 90·7	172 84 341 68 202	95,030 9,869 54,219 11,271 53,940	652·8 L45·1 22·4 14·7 144·2	
Others N. Kleinfonte 1 Wit. Nigel	83		2.5	D	710 36	85,438 8,778	L30-2 13-6	795 36	92,632 8,593	L46-1 15-3	

Gold has been valued at 249s. 6d. (July 250s. 0d.) per oz. fine. L indicates loss. † Working Profit. *Working Profit includes sundry revenue. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.





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Financial News and Results

No Interim From Larut.—Larut Tin Fields have announced that no interim Fields have announced that no interim dividend is to be paid this year, although consideration will be given to the pay-ment of a final dividend when the ac-counts are closed for 1958. Larut has suspended dredging operations because of the low quota allocated to it under the tin restriction scheme.

Offer For Heidelberg Estates.- A formal offer of 13s. 6d. per £1 share has now been received from an undisclosed source by the directors of Heidelberg now been received source by the directors of Heidelberg Estates. Subject to the clarification of certain matters, the board recommends the acceptance of the offer, which they will accept in respect of their own shareholdings. Documents are now in the preparation, and a further course of preparation, and a further communication will be sent to share-holders in the near future.

Mazapil Copper. — Mazapil Copper made a loss of £2.264 in 1957, compared with a profit of £76.486 in the previous year. Both figures are after tax, and a Mexican Government subsidy of \$237.716 has been taken into account year. Both figures are after tax, and a Mexican Government subsidy of £227,716 has been taken into account in the 1957 loss. Taxation in the latter year has been charged on an O.T.C. basis. The dividend is again passed, and after transferring £40,303 to reserve, the balance carried forward is reduced from £77,007 to £34,408.

Reverse For Kent (F.M.S.).—Opera-tions in 1957 ended in a loss of £3,944 before taxation for Kent (F.M.S.) Tin Dredging, against a profit of £2,553 in the previous year. The reverse was mainly caused by a sharp rise in costs of almost 2d. per cu. yd., caused in turn by a high proportion of tough, barren clay in the ground dredged. Also as a result of the clay, the higher returns forecast for the end of the year did not materialize. In his advance statement, Mr. W. E. Hosking, the chairman, says that should quota levels be further reduced, the dredge may be put on care-and-maintenance and the quota sold. Meeting, Redruth, September 24.

Malaysiam Profits Steady.—Although actual mining profits showed a decline from the previous year's level, higher sundry revenue and lower administration sundry revenue and lower administration costs almost compensated, leaving Malaysiam Tin's profits for the year ended last March only £320 lower at £6.421. Taxation took £1.257 against £1.663, and after transferring £3.770 to general reserve, £3,348 is carried forward against £1.798 brought in. Meeting, London, September 24. Sir Joseph Ball is chairman. is chairman.

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GEEVOR TIN MINES

The forty-fifth Annual General Meeting of Geevor Tin Mines Ltd. was held on September 10 in London.

Mr. G. W. Simms (the Chairman), resided, and the following is an extract from his statement for the year ended March 31, 1958:

The profit (before taxation) amounted to £59,278. After providing £36,907 for taxation, the Directors recommend the payment of a final dividend of 1s. 3d. per Stock unit, making, with the interim dividend of 6d. per unit, a total distribu-tion for the year of 1s. 9d. per Stock unit, less income tax, requiring £20,769.

Ore mined totalled 66,577 tons. tonnage sent to the Mill was 63,829. This yielded 683 tons of black tin (65 per cent Sn), an average of 23,97 lb. of black tin per ton of ore milled.

Operating costs at the Mine were higher by 2s. 4d. per ton of ore milled, due to higher wages paid and to a small increase in the number of men employed.

I make no excuse for again referring to the penal nature of mine taxation in this country. Almost every year representations have been made to the Government asking that action be taken to bring mine taxation here into line with countries such as Canada, Australia, and countries such as Canada, Australia, and the U.S.A., who have for long recognized that taxation as applied to a mine operates on a wasting asset and that it is necessary to make adequate provision for that fact if the metal mining industry is to survive and prosper. It is hoped that the present Chancellor of the Exchequer will recognize the need for action in his next Budget.

The report was adopted.

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Antimony— English (99%) delivered, 10 cwt. and over £190

per ton Crude (70%) £190 per ton Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit, c.i.f.

Arsenic, £400 per ton Biamuth (min. 1 ton lots) 16s, lb, nom. Cadmium 10s. 0d. lb. Cerium (99% net), £16 0s, lb, delivered U.K. Chromium, £r. 99% 6s. 11d. lb. Cobalt, 16s. lb. Germanium, 99.99%, Ge. kilo lots 2s. 8d. per gram Gold, 250s. 64d.

Lidium, £20/£22 oz. nom.

Lanthanum (98/99 %) 15s. per gram.

Manganesse Metal (96% 98 %) £290

Magnessim, 2s. 54d. lb.

Nickel, 99.5% (home trade) £600 per ton

Osmirnidium, nom.

Osmirnidium, 1/£18 oz. nom.

Palladium, £5/£5 15s.

Platinum U.K. and Empire Refined £23 5s. oz.

Imported £19 0s./£21 0s.

Quicksilver, £79 0s. ex-warehouse

Rhodium, £40/£42 oz.

Ruthenium, £14/£16 oz. nom.

Selenium, 50s. 0d. per lb.

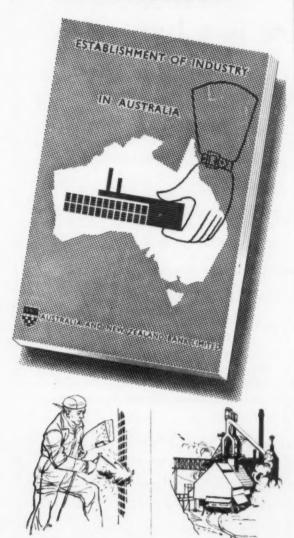
Silver, 76/40 f. oz. spot and 75½d. f'd.

Tellurium, 15s./16s. lb.

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Chrome Ore-	-									
Rhodesian	Metallur	gical	(semifi	riable) 4	8%	(Ratio	3:1)		**	£15 15s. 0d. per ton c.i.f.
	Hard Lu	mpy	45%			(Ratio	3:1)			£15 10s. 0d. per ton c.i.f.
	Refracto	ev 40	0/							
	Smalls 4	140/	, a			(Ratio	3:1)			£14 0s. 0d. per ton c.i.f.
Balu chistar	48 %					(Ratio				£11 15s. 0d. per ton f.o.b.
Columbite, 6		blood		bish a	-nda					nom.
	o com	omea	Oxides	, militie il	raup	**	**	**	**	BOIII.
Fluorspar-	WW									COO 10- 04
Acid Grade					8.5	* 8	8.8		8.8	£22 13s. 3d. per ton ex. works
Metallurgic		1% C	aF ₂)	**		**				156s. Od. ex works
Lithium Ore-										
Petalite min	1. 34% 1	Li ₂ O								40s. Od./45s. Od. per unit f.o.b. Beira
Lepidolite :	min. 34 °	Lie	D							40s. 0d./45s. 0d. per unit f.o.b. Beira
Amblygoni	te basis	7% 1	i _o O		**					£25 0s. per ton f.o.b. Beira
Magnesite, gr										£28 0s./£30 0s. d/d
Magnesite Ra										£21 0s./£22 0s. d/d
Manganese O	ne India	DAM'	6.0	2.0	**			* *	* *	and on fame on old
			in 69.	GA Cont	whe					nom.
Europe (46	10-40	o) Das	ES 0/3.	08, 1101	Ruz	**	5.5	**	5.5	nom.
Manganese O	re (43 %	- 43	(0)	3.5	2.5	5.5	2.5	* *	5.5	nom.
Manganese O	re (38 %	- 40	(0)	2.5		**	8.8	5.5	4.8	nom.
Molybdenite		isis)	**	**	**		8.5	8.5	**	8s. 5d. per lb. (f.o.b.
Titanium Ore										
Rutile 95/9	7% TiO	e (pro	mpt de	divery)	**		**	**		£35/£36 per ton c.i.f. Aust'n.
Ilmenite 52	154 % T	0.			**	**				£11 10s. per ton c.i.f. Malayan
Wolfram and					4.6			* *		60s. 0d./65s. 0d. per unit c.i.f.
Vanadium-		400	/4/	4.0	2.5		2.0			and and also are fire many many
Fused oxid	- 05%	VA								8s. 11d. per lb. V ₂ O ₄ c.i.f.
Ziroon Sand	A material	1	68 66	o/ 7:0	1				**	£14 On, per ton c.i.f.

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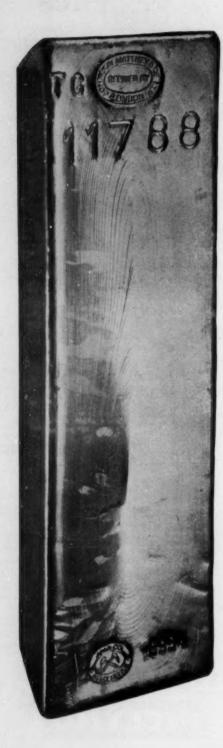
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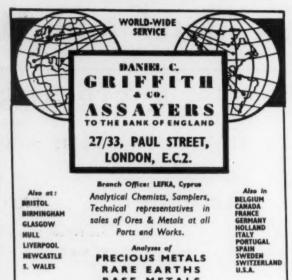
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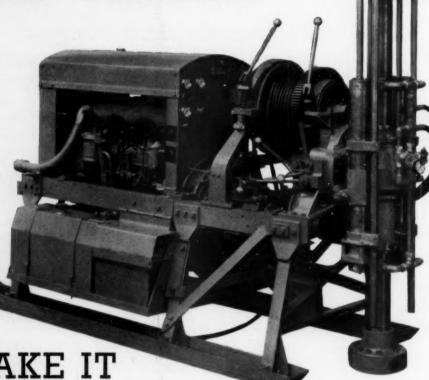
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